How Low Is Too Low With Salt in Heart Failure? Randomized Studies Needed to Resolve Concern

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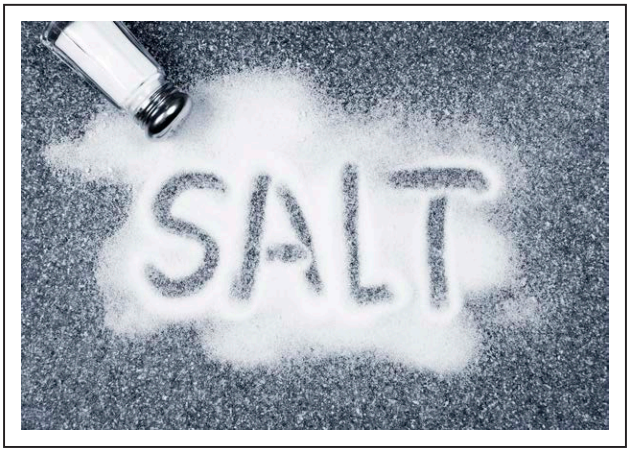
Low-salt diets have been a mainstay of treatment for patients with heart conditions and hypertension, but emerging evidence suggests potential harms to this approach.

A growing body of observational data has suggested there may be potential harms to salt restriction. As a result, some groups such at the World Heart Federation have recommended moderate rather than low levels of salt intake. But the data are complex, and many questions remain that only randomized trials can answer definitively.

This is particularly true for patients with heart failure. Some studies have found increased mortality or poor nutritional status for patients with heart failure consuming a low-salt diet. Gold standard clinical trial data are lacking to verify this correlation, although some trials are underway.

"What we know is a lot less than we think we know," said Scott Hummel, MD, MS, an assistant professor of cardiovascular medicine at the University of Michigan and director of the heart failure program at the Ann Arbor Veterans Affairs Health System.



Some observational studies have suggested that low-salt intake may be associated with a poor health outcome for patients with heart failure. Now, some randomized trials have been launched to provide more definitive answers.

THE SKINNY ON SALT

Much of the evidence supporting a low-salt diet stems from studies that demonstrate that lowering sodium intake can help reduce hypertension, explained Andrew Mente, PhD, associate professor in Health Research Methods, Evidence, and Impact at McMaster University in Ontario, Canada. But more recent data from studies in the general population have not found a benefit to lowering sodium for people without elevated blood pressure.

"We believed that lower was better," Mente explained. "It doesn't quite work that way. For people without hypertension who are generally healthy, eating a normal amount of salt has a minimal effect on blood pressure."

Data from the Framingham Study published in the *Journal of the Federation of American Societies for Experimental Biology* in April that analyzed the blood pressure and dietary intakes of 2632 people aged 30 to 64 with normal blood pressures found that individuals with the lowest blood pressures actually had higher intakes of both sodium and potassium, whereas those with low sodium and potassium intakes tended to have higher blood pressure.

"These long-term data from the Framingham Study provide no support for lowering sodium intake among healthy adults to <2.3 g/d as recommended," the authors wrote.

The American Heart Association currently recommends that individuals consume ≤2.3 g/d and ideally reduce their salt consumption to ≤1.5 g/d to maintain a healthy blood pressure. But other groups such as the World Heart Federation have moderated their stance, recommending that individuals who consume >5 g/d reduce their intake, according to a January report in the *European Heart Journal*.

Data from observational studies find that both very high sodium consumption >5 g/d and very low sodium intake are associated with an elevated risk of heart attack, stroke,

and death, Mente noted. Those individuals who fall in the middle, consuming 3 to 5 g of sodium per day, a fairly typical amount for a Western diet, seem to fare best, he said.

"We find that there is actually a sweet spot for sodium, where being in the middle tends to be optimal," Mente said.

One reason lowering salt too much may be harmful is that it activates the renin-angiotensin system triggering the production of hormones that could have harmful cardiovascular effects, Mente explained.

Although the observational data are concerning, there is wide agreement that randomized trials are needed to provide definitive data. There is always a possibility that factors associated with salt intake and not salt itself might be responsible for the trends seen in the observational studies. For example, people who are very ill and at risk for poor outcomes may have poor nutritional status overall, including less intake of salt and many other nutrients, as well. This may give the impression in observational data that low-salt intake is associated with worse outcomes.

"To settle the debate, what we need is a large, long-term randomized trial comparing low sodium (<2 g/d) with the usual intake (of ≈3.5 g/d) in the general population," Mente suggested.

Until more randomized trial data are available, Mente suggested clinicians recommend moderate sodium levels in the 3- to 3.5-g/d range. "Right now, a more cautious approach would be appropriate," he said.

SALT AND HEART FAILURE

There is an urgent need for clinical trials of salt restriction in patients with heart conditions, in particular, studies that can help clinicians better understand the risks and benefits of this intervention for patients with heart failure.

"It's hard for people to follow a low-salt diet, but it is thought it might be physiologically helpful for (patients with heart failure)," explained Hummel.

The aim of sodium restriction in this population is to reduce fluid retention, and the current target recommended by the Heart Failure Society of America falls into the low-to-moderate range of 2 to 3 g/d.

But several studies have identified potential harms of low sodium consumption among patients with heart failure, including higher mortality, longer hospitalizations, and higher rates of readmission.

One potential reason for harm is activation of the renin-angiotensin and sympathetic nervous systems, noted Hummel. However, contemporary treatment regimens for patients with heart failure include drugs that would block these effects. He noted that some of the studies that found harm used older treatment regimens and prolonged high diuretic doses.

"You have to adjust the treatments patients are receiving to their physiological state," Hummel explained. He noted that preliminary results from the pilot phase of a trial called SODIUM HF (Study of Dietary Intervention Under 100 mmol in Heart Failure) that adjusted diuretics and other patient medications found beneficial effects of sodium restriction on patient quality of life and B-type natriuretic peptide levels.

Hummel and his colleagues identified another potential explanation for sodium restriction–related harms in a study they presented at the American College of Cardiology Meeting in March. When they assessed the diets of 37 elderly patients with heart failure on hospital admission, they found that patients who reported low-sodium intake ate fewer calories overall and had micronutrient deficiencies, confirming the results previous studies.

"It doesn't necessarily mean people shouldn't eat a low-sodium diet," Hummel said. "But when you recommend a low-sodium diet, some people take that as I should eat less of everything."

The results suggest that clinicians may need to pay closer attention to their patient's overall nutritional status.

"We've been focused on dietary sodium for so long, and that may be important, but there are probably a lot of other important aspects of diet we are not paying attention to."

To better understand the role of diet and salt in heart failure, he and his colleagues are wrapping up their GOURMET-HF study (Geriatric Out of Hospital Randomized Meal Trial in Heart Failure). The trial randomly assigned 66 patients discharged from the hospital after treatment for heart failure to either home-delivered meals that are low sodium and compliant with the DASH (Dietary Approaches to Stop Hypertension) diet or to usual dietary advice. They hope the trial will yield more information on how to boost patients' quality of life, and will analyze biomarker data to look for potential signs of harm.

Until more data are available, Hummel says he typically recommends a lower sodium intake between 2 and 3 g/d to his patients with appropriate medication adjustments and monitors their overall nutrition status. He expects that even with these recommendations most will end up at ≈3 to 3.5 g/d. He also often refers patients to a dietician who can help them to develop a nutritious lower-sodium diet that takes into account their own food preferences.

"What we know is that one size does not fit all," Hummel said. "What makes sense for a treatment plan 1 day may not be the same the next day. You have to keep assessing your patients and deciding what is appropriate." ■

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